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A STUDY IN CORRELATION OF NORMAL COMPLEXES BY MEANS OF THE ASSOCIATION METHOD

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I. This experiment in the Association Method was undertaken with a view to making a study of emotional complexes. More especially it was intended as a test of the validity of the Freudian theories in regard to fundamental complexes, if such a test could be made by means of the Word-Association Method. Through the work of Jung, and some others, the Association Method has become established as a means of "tapping the subconscious" in cases of abnormal mental states or of nervous disease. Extensive experiments have been made with normal persons also, but not, the writer believes, with the specific aim of testing for the presence of what may be called the "Freudian Complexes." To see if the Association Method could be used to uncover such complexes in normal persons was, then, one aim of the experiment. This sort of experiment has been used effectually for this purpose in the testing of hysterical or neurotic cases, in which the symptoms of complex are pronounced. While the "complex signs" in the normal individual are seldom so clear and unmistakeable it was thought that if the complexes that are emphasized by Freud were present in any degree the results of the experiment should yield some traces of them.

Incidentally the experiment was expected to yield some new data for the study of individual types, since there are still many problems along this line inviting further investigation.

II. The method pursued differed from the auditory-verbal method commonly used in that the stimulus was a printed word exposed upon a card-changer and the response that marked the reaction time was a motor response made by pressing a Morse key with the finger. This method has some advantages over the auditory-verbal method, and also some inherent disadvantages that became apparent in the course of the experiment. Exposing the printed word gives less variability in the presentation of the stimulus than does pronouncing the word, with fewer chances of misinterpretation;

also, it allows investigation of the very interesting phenomenon of misreading. In the similar phenomenon of mishearing, occurring with the auditory stimulus, it is not so easy to determine how far the error was due to external causes and how far to psychical causes as it is in misreading. With the printed word and the card changer the method is more mechanized. Besides, this method permits the use of the chronoscope which is a more accurate recorder of time than the stop watch. The method has obvious disadvantages when uneducated observers are used, but the writer can see none that would operate with educated observers. Another point in favor of the printed word is that people are more accustomed to seeing isolated words than to hearing them, and that, therefore, the experiment is given a less unnatural atmosphere by the use of the visual stimulus. The method of the reaction is more open to criticism, as will be shown later.

The stimulus words formed a series of 154, with Jung's list of 100 taken as a basis. The number was increased considerably above the usual 100 in order that there might be at least 100 perfect reactions from each observer after all erroneous and interrupted ones were subtracted. The words were mostly substantives and almost all were of possible significance, it being thought that words significant to one observer would be neutral to another and that the proportion of significant and neutral words would adjust itself in each case. This supposition apparently was justified by the results. The words were printed in uniform type—spaced capitals—and exposed on a card changer that was connected with a Hipp chronoscope, so that the fall of the shutter, exposing the word, started the clock. The reaction was made by hand, with a Morse key, which stopped the clock. The association word was uttered at the instant that the motor reaction took place. A voice key was at first tried, with the purpose of making the word uttered by the reagent act upon the clock. This could not be made to work satisfactorily, however, so the Morse key was substituted. Eight observers, five women and three men, seven of them being students and instructors at the University, and presumably normal persons, participated in the experiment. The eighth was a distinctly abnormal mental type, being a young woman suffering from an hysterical neurosis. Before the main experiment was begun all observers were given a practice series of from 25 to 50 words so that none was inexperienced.

As the "Ausfrage" method was used, involving full inspections with taking of notes by the experimenter the experi-

ment with each individual necessarily covered many hours. With only two exceptions the work was never carried on for more than fifty minutes with a single observer on one day. The usual method followed was to have each observer for one hour each week, and as a minimum of 12 words and a maximum of 30 could be given and reacted to, with noting down of the introspection, in the hour, the experiment extended over a period of nearly four months, with all but the observers above mentioned. These two performed the experiment in three and five days, giving two or three hours at a time to the work. Fatigue effects were especially looked for in these cases, and, while present, were not found prominent.

After the series had been completed it was repeated with such observers as had time for the repetition, in order to test the evidences of complexes. Only two observers were able to complete the repetition series, while two others repeated about one third of it. The other four had no repetition. This series is therefore not treated separately, but its results are considered, along with the results of the main series, in the part of the thesis dealing with the occurrence of complexes.

There is a distinct advantage to be claimed for that feature of the method here employed that causes the experiment with each individual to extend over months instead of over one or two hours, as in Jung's method. This is the eliminating of the possibility that the association series will be dominated by a single mood, or affected by a single unfavorable condition. It is true that the conditions for each hour cannot be uniform but of more advantage than uniformity is the certainty that almost the whole range of the personality will come into play. As conditions were carefully noted at each period the effect that unusual circumstances were likely to have could be better measured when many periods of an hour each were included in each series.

As five out of the eight observers were of the visual and kinaesthetic types, associating a visual or kinaesthetic image before a word, and claiming great difficulty in getting a word as a response at all, even in the most trivial associations, these persons were permitted to give the motor reaction only, and the instructions were varied to read "As soon as another word, or a definite idea or image, comes to mind, react by pressing the key." Such a variation might be suspected of affecting the reaction time to such an extent as to make it of no experimental value. There is complete lack of evidence that it had any material effect, however, while as evidence that it did not cause any important variation in the time

there is the fact that observers of this type are at both extremes of the scale of quickness of reaction, and that their reactions are susceptible to the same physical and psychical influences, show the same fluctuations, the same relation to emotions, and can be correlated in the same manner, as the verbal reactions. There is also the fact that some of these observers finally learned to react with words and after this was fully learned as a mode of reaction the time averaged about the same as the purely imaginal reaction time. The word was nearly always a mere adjunct to the image, except where there was a clang-association, and in such cases the image connected now with the stimulus word and again with the reaction word in almost regular alternation. Clang-associations were wholly confined to the imaginal types, indicating that the verbal reaction was unnatural and forced. An advantage may therefore be claimed by the wordless reaction in such cases; namely, that the association obtained would be of the sort most natural to the observer, and would be accompanied by a minimum of difficulty. It seems probable that by this method there would be a smaller mean variation than by the verbal method, as the motor reaction tends to take place, after a certain interval, regardless of the content of consciousness, whereas, if there has to be a spoken word, there might be numerous difficulties in the way of its articulation. As a matter of fact there is no significant difference in the mean variations of the different observers, leaving out the one abnormal case. What difference there is is on the opposite side; i. e., the imaginal types show a slightly greater mean variation than the verbal types. Individual differences, to be brought out later, seem the most probable cause of this.

While it is felt that this departure in method does not invalidate the results of the experiment, it does raise some real difficulties. Because the tendency toward the motor reaction tends to fulfill itself regardless of the content of consciousness the delays caused by distraction or emotion are slighter than they might be if words were demanded. The fact that those observers who did react with words showed no greater variation in the face of distraction might well be explainable by differences of individual type. The doubt that arises from this condition of affairs affects the validity of comparisons between these two types. When the results of this experiment are compared with results obtained by Jung, Riklin, Wells, Kent, and others, moreover, the lengthened reaction times here considered significant are so much less lengthened than those of the above-named experimenters that

they may seem insignificant. Rarely does the time, in this experiment exceed 3.5 seconds, and 2+ is the commoner maximum. Nevertheless, within each individual series there is a sufficiently typical variation, though its range is small. While the time does not furnish so striking an indication of the complex as when time is more prolonged, it nevertheless furnishes a sign, since it is generally relatively longer in cases where there is reason to suspect an inhibition than in others. By this method there is left room for falsification by the observer, of course, but the reaction time, bodily movements, and general behavior, supply some check to falsification. It should be said that all observers gave the *appearance* of good faith, though of course this cannot be trusted too far. The experimenter recognizes the fact that falsification may be unintentional or unconscious.

When the experiment was about two thirds completed the draw-backs indicated above became apparent, and all observers were instructed to react verbally, no matter how much effort it cost. Some had completed the series at this time and were beginning the repetition. Some, however, had nearly completed the series and could not spare time for the repetition. There was only one from whom no verbal reactions were obtained, while others of the imaginal type gave anywhere from one tenth to one half verbal responses. This irregularity makes difficulties in tabulation of results, but the difficulties are not insurmountable. While many points that might be of interest, such as would arise from comparisons of different verbal forms, cannot be treated because of the irregularity and dissimilarity of the reactions, there is no good ground for thinking that the main objects of this investigation are rendered inaccessible.

III. The first step in correlating the results of the experiment was the determination of the association type of each observer. The preliminary experiment had shown that certain types of mental reaction were associated with high and low reaction time. A study of the typical reactions revealed the mental character of the subject.¹ Because of the greater number of emotional reactions in the main series this correlation is less definite than in the preliminary series, where no words designed to arouse complexes or emotions were found. Still, a relation between the average reaction time and the mental type is discernible. This study of reaction-type neces-

¹ Reported before Southern Society for Psychology and Philosophy at Atlanta, December, 1913. See "Proceedings of Southern Society," etc., reprinted in *Psychological Bulletin*, February, 1914.

TABLE I
Correlation between time and association type

Ob- server	No. of reac- tions counted in aver- ages	Av. seconds	Me- dian	M. V.	FORMAL TYPE			REACTION TYPE	CONTENT TYPE				GENERAL TYPE
					Co- ordi- nate	Sub- ordi- nate	Supra- ordi- nate		Emo- tional reaction	Ego- centric	Com- mon	Partic- ular	
*R.	144	*.647	*.577	.210	17 Av. time .827	127 Av. time .754	0	Vis. Im., clear cut, few details or ad- ditional tenden- cies not verbal ex- cept when forced.	16½%	10%	13½%	86½%	Concrete, personal reference, occa- sionally emotional, non-self-conscious, few complex signs.
H.	136	.871	.830	.227	16 Av. time .864	119 Av. time .921	0	Vis. Im. and clang words, few details, but additional as- sociations.	27½%	40%	5%	95%	Concrete, intellec- tual repressed em- otion, personal re- ference, unconsc- ious of comp. signs.
Be.	143	1.021	.925	.344	19 Av. time .748	107 Av. time 1.173	17 Av. time .929	All sorts of imagery, kinaesthetic pre- dominant. Words used as names for images.	35%	8%	88½%	11½%	Concrete, aesthetic, emotion, richly imaginal. Com- plex mildly pleas- urable.
K.	150	1.05	1.013	.249	75 Av. time 1.047	72 Av. time 1.212	6 Av. time .926	Verbal, automatic, few images, few additional asso- ciations.	17%	4½%	99.4%	.6%	Abstract, intellec- tual, repressed em- otion, many com- plex signs which are unconscious.
S.	150	1.089	1.037	.266	0	150 Av. time 1.089	0	Vis. Im., clear and detailed, no words, meanings.	24%	7½%	73%	27%	Concrete, emotion- al, non-self-con- scious, complex signs conscious.
O.	142	1.14	1.076	.274	116 Av. time 1.136	16 Av. time 1.528	1 Av. time .865	Verbal, automa- tic, with frequent thought processes.	20%	2.6%	97%	3%	Intellectual, some- what emotional, logical, complex signs conscious.
Ba.	150	1.363	1.2	.382	6 Av. time 1.384	135 Av. time 1.472	0	Vis. images, de- tailed and definite. Words only names, meanings.	23%	39%	18%	82%	Concrete, self- conscious, moder- ately emotional, complex signs, often conscious.
T.	136	1.788	1.612	.580	105 Av. time 1.012	31 Av. time 2.012	1 Av. time .515	Verbal, with an effort, frequent visual and audi- tory images, fre- quent affective tone.	39%	10%	70%	30%	Concrete, emotion- al, slightly self- conscious, many complex signs which are con- scious.
Abnor- mal									2.816	1.743	1.767	1.923	

* R. is suspected of reacting prematurely, making time too short.

sarily precedes an examination for complexes, as the manner of exposing a complex is obviously not independent of the observer's natural association habit.

The correlation between the average and median reaction times, and the reaction type of the observer is brought out by Table I. The commonest type of reaction is by visual image, with the association word as a mere adjunct, oftenest a name given to the image, when it is not omitted entirely. Only two, K and O, responded easily and naturally with words. The others did so with effort, often gave clang associations, or variations of or additions to the stimulus word, and claimed that the image was always first in order and that it was the essential part of the association. No generalization can be made as to the relative quickness of the verbal versus the imaginal type. The imaginal types stand at the beginning and at the end of the scale,² while the verbal automatic types are fourth and sixth in order.

The observer holding fourth place had very meagre associations, introspection frequently showing nothing beyond the word. Perseveration was of fairly frequent occurrence, and evidences of unconscious inhibition were present. The observer in sixth place had frequent thought processes though few images. This observer was cognizant of the purpose of the experiment, therefore his associations cannot be placed altogether on a footing with the others. Allowance is made for this fact in the analysis of complexes—but this knowledge on the part of the observer has less effect than might be expected. As a rule any thought of connection with the experiment was a *secondary* association, while the first was, like those of other observers, a naïve response. The main effect of this foreknowledge is seen in the reaction time. The attitude was one of expecting "significant" words, and this often prolonged the time when no emotional complex was present. Other vitiating factors have been noted, as far as possible, in all cases, and any reactions that were suspected of being affected by fatigue or physical disposition are excluded from the tabulation. The reactions of one observer which took place on a very warm afternoon have all unusually long reaction time, so these are excluded from general tabu-

² Observer R, who stands first in Table II, as the observer who has the lowest average time, gives some reason for suspecting that his reaction time is in reality too low. He may have reacted before an association came. His quantitative data will be starred wherever it occurs, in order to show that it is questionable. In other than quantitative aspects his reactions are entirely valid, and will be treated as valid.

lation, though they are not altogether disregarded. Whenever conditions were unusual the results were scrutinized carefully and compared with those obtained under normal conditions and where differences were apparent the former class of results were not accepted as of full value, though they still might be useful for determining some points. Whatever examples of associations are given, and whatever conclusions are drawn, in this thesis, are taken from those results only which are free, as well as the experimenter can judge, from vitiating influences.

Though no direct correlation is apparent between the imaginal and verbal associations and the reaction time, there is a correlation between the time and the *richness* of the image, or the profusion of images. Those of imaginal type who had images with few details, and with no personal meaning attached, have a low reaction time. Those who get clear cut and detailed images, with personal associations or frequent affective tones, have a high reaction time. Associations in a subordinate or predicate relationship to the stimulus predominate in the imaginal type, while co-ordinates predominate in the verbal type. Supra-ordinates are of rare occurrence in both. So far as the experimenter knows this correlation has not been observed in any previous work with the association method. How far it holds good must be determined by experiment with a larger number of individuals. The subordinate, or predicate, type, indicates, in the cases here studied, a concrete type of thought, while the co-ordinate type is rather abstract. The latter has a shorter reaction time than the former, when emotional and significant reactions are excluded.

There is some relation apparent between the egocentric type of association and the time, as contrasted with the less personal type. With the exception of observer H, who has a very low reaction time, a large number of egocentric reactions accompanies a high average reaction time. The introspections reveal the degree of *self-consciousness* also, and this bears a direct relation to the reaction time. Observers Ba, K, H, and T, are usually self-conscious, while the other four are less so. Observers Ba and H frequently saw themselves in the picture brought up in an association.

In general it may be said that a low reaction time characterizes common, non-self-conscious associations and abstract types of thought. This is true when "complex" reactions are excluded. High reaction time characterizes the egocentric, self-conscious, and concrete association types. When emotional reactions are ruled out this correlation becomes definite.

As in most experiments of this sort, individual differences cause many exceptions to be made to almost every general conclusion that one may attempt to draw. Nor are the individual traits revealed the least interesting and important results yielded by such an experiment. The discovering of the individual character by means of the experiment seems in itself worth while, and suggestive of practical application of the method.

A most striking and important difference, and one that has been fully treated by Jung (10, 11), is the difference between the normal and the abnormal observer. One abnormal observer, a young woman suffering from an hysterical neurosis, was included in this experiment for the purpose of making the comparison at first hand. The greater part of the published material on complexes deals with abnormal cases, and the experimenter felt the need of getting experimental evidence on her own account for the difference—or rather the exaggerations—of the abnormal type, when compared with the normal, in order to avoid misconceptions. The abnormal observer was a typical neurotic, not an extreme case. The abnormal *exaggeration* of various association phenomena is in her case fully evident. She shows the highest average time, and also the highest single reaction time. Her average time is 1.788, which is more than 400 sigma in excess of the next highest. Her highest single reaction time is 8.487, while the nearest approach to this by any other observer is 4.958. Five of the normal observers never exceed 2.880 as a maximum. This observer frequently showed difficulty in obtaining an association even when no complex was in evidence. When a complex was struck emotion was much more intense than in any of the normal observers though some of the latter showed a greater number of emotional reactions. The abnormal observer showed frequent inhibition and “blankness” followed sometimes by a sense of complete helplessness and despair. This was once strikingly described as “a feeling as if I were in a burning theatre and could not get out.” The feeling of helplessness grew until she finally reacted (by pressing the key) in order to end it. The neurotic patient exhibits the phenomena of inhibition and emotion in much more marked degree than any of the other observers. Infantile associations were more frequent and more important in this case than with the normal observers, with whom, indeed, they could seldom be detected. The principal differences between the normal and the abnormal types are shown in Table II.

TABLE II

OBSERVERS	NORMAL							ABNOR- MAL
	Ba	Be	H	K	O	R*	S	T
Number of infantile as- sociations.....	4	2	5	0	0	5	5	9
Number of marked in- hibitions.....	11	4	4	6	16	8	9	16
Number of cases of pain- ful effort.....	6	1	3	1	3	2	6	13
Number of cases of marked emotion.....	6	6	3	5	8	7	9	18
Number of failures to associate.....	6	0	1	0	7	4	4	11
Number of failures to make reaction.....	0	0	0	0	1	2	0	5
Highest reaction time..	4.958	2.880	2.014	2.23	2.5	1.958	3.2	8.487
Lowest reaction time...	.572	.338	.331	.469	.559	*.347	.397	.582
Mean variation.....	.382	.344	.227	.249	.274	.210	.265	.580

* This marks the observer whose reaction time is suspected of being too low.

A difference that cannot fail to be important to an investigation with the end in view of studying complexes is the sex difference. The average of the median times of the men observers and of the women observers is exactly the same, .951, if the neurotic patient is omitted from the woman's list. Again, here, the number is too small to permit of generalizations, but it may be said that were it not for the average of one man who gives some reason to suspect that his association time is too short—that he reacted before an association really came—the average of the men would be larger than that of the women. One male observer who was unable to complete the experiment, and whose results are therefore not included, was among the long-reaction-period types, and if his results had been tabulated with the others the reaction average for men would have been noticeably higher than that of the women; the number of normal observers of each sex would have been equal also, as was at first intended. Other experimenters who have published results have almost uniformly found the time of women to be longer than that of men, but Wells (19) pertinently suggests that this result was

very likely influenced by the fact that the experimenter was a man, which circumstance might give rise to many more inhibitions in the women. In this experiment the experimenter was a woman, which may have had an influence in raising the average of the men. The mean variation of the men is greater than that of the women, which fact is in line with the foregoing supposition, though it would be unjustifiable to assign the circumstance of the experimenter's sex as the cause of this.

The sex differences found may be summed up as follows: Median time for each .951, but with reason to believe that the men's median should have been higher; mean variation for men, .289, for women, .271; egocentric reactions for men, 17.2%, for women, 14.9%. Men have 42% common associations, 58% particular, 20% emotional, 26 $\frac{2}{3}$ % "significant," 7.7% inhibited, 64% predicate, 25.9% co-ordinate, and .06% supra-ordinate. Women have 66% common associations, 34% particular, 25% emotional, 23% significant, 3.8% inhibited, 74% predicate, 18% co-ordinate, 3 $\frac{1}{3}$ % supra-ordinate.

Another factor that is expected to play a part in determining individual differences is that of age. As age increases repressions should increase, associations become less personal and more standardized or conventionalized, and complexes become more clearly marked. But here again individual variations of character make it difficult to generalize. Perhaps *mental* age, or better, degree of sophistication, if these could be determined would furnish better criteria. The ages ranged from 22 to 38, and as the years of the twenties and thirties are apt to be fullest of emotional experience there should be room here for a distinct progression. There is such a progression although it does not proceed with regularity. Cultural differences are more apparent, and these modify the age differences, but they cannot be tabulated in the same way, for obvious reasons. It is found that the younger give, as a rule, more egocentric reactions but that the middle grade have more significant and emotional associations, excepting the abnormal subject, who was among the younger. The older ones have rich and profuse associations, with less personal reference.

Those who have the habit of imaging naturally have great difficulty with words that do not suggest an association capable of being imaged. Abstract and emotional words may thus be met by a delayed reaction which has a cause quite outside the ideational content of the word. The verbalizers have no such difficulty and may respond to abstract words with greater ease than to concrete and simple ones to which they cannot readily find an opposite or synonym. This point also brings

out the fact mentioned by Wells (19), that few "free" associations are really free when in an experimental series. They tend to become "controlled," that is, the observer sets up a certain form of response for himself to which he unconsciously tries to conform. In determining the 'complex' value of a reaction these peculiarities of individuals must be taken into account. The verbalizers also have trouble with a reaction word of two or more syllables, and with one that is a different part of speech from the stimulus word—in short, with any response that does not fit into their customary method. When the imaginal type gives words he feels none of these difficulties because the words mean much less to him. The egocentric type likewise hesitates over a word that does not recall a personal experience. There is a sort of perseveration of the *mode* of response that is not altogether dependent upon the observer's mental character. It depends partly upon the mode with which he starts out. The experimenter may be able to change this mode by suggestion, and the new mode thus set up soon becomes habitual.

The obstacles to getting exact correlations and drawing definite conclusions that have been mentioned are probably present in the most extensive and carefully performed experiments almost as fully as in this attempt. The arbitrary uniformity of the response would not really obviate the difficulties involved here in the discrepancies between imaginal and verbal types. The writer is inclined to think that the fundamental differences in these two types have not yet received discriminating consideration. Those who were imaginal in their thinking would have the same difficulty in finding a verbal response that the observers in this experiment had, and the result would be a prolonged reaction time because they are allowed no alternative to a verbal reaction. On the whole, making allowance for difference in method, the results found here as to mental types, age, and sex, and as to the rôle of external influences, do not differ materially from the well known conclusions of Jung and Riklin, Wreschner, Ziehen, Wells, and others. That a great part is played by emotion is axiomatic. With Ziehen (22) we find that unpleasant emotion has the greatest retarding effect, while pleasurable emotion so facilitates the response as to bring the time below the average. Aschaffenburg (1) has found that fatigue and distraction increase the tendency to clang, irrelevant, and perseverating associations, and this experiment corroborates his assertion. Lipmann (14) maintains that this fact is not a disadvantage in investigating complexes, as it actually means

that repression is lessened, that inhibiting power is lowered, and that the complexes have a freer outlet. The data of this experiment are not without confirmatory evidence for this assertion. Still, in analyzing the experimental data with the purpose of discovering the emotional complexes that may be present, all such factors as fatigue, distraction, interruption from outside, and the physical conditions, should be given full weight as interferences. The central fact that makes the association method of value is that the observer reacts toward the word in some measure as he would react toward the actual situation that the word represents. The extent to which he actually does identify the mere word with a situation is often surprising to one not initiated into the mysteries of the association experiment. To some word of disagreeable import, for example, he reacts quickly, shuddering, without waiting to get a definite association word "because he wanted to get it over with and thought the reaction would end it," which is, perhaps, equivalent to turning tail and taking flight. It is this attitude toward the words used in the experiment, which quickly establishes itself in every observer, that causes the centrally aroused processes to be generally stronger than any external interferences.

IV. Having cleared the ground by the foregoing discussion of types, differences, and general reaction-characteristics, we come to the main part of our inquiry, namely, How are complexes indicated by the reactions collected? There are complexes present, as has been hinted already. How these are determined, what evidence for them is accepted, and what is the general significance of those found, also what their particular significance for the Freudian Theories, will occupy the remainder of the thesis. No complex is catalogued that is not indicated by more than one 'complex sign,' and as a rule more than one reaction will be required to establish a single complex. The 'complex signs' considered as indicative of complex are here enumerated and described.

1. The quantitative indication of unduly prolonged reaction time is the first to be noted. Jung states that the excess must be at least .5 seconds in order to be significant. His average reaction time is 1.5. Some experimenters say that the smallest increase to be considered is 1 second. It depends upon the average or normal reaction time of the reagent. As has been pointed out in the discussion of the method, the reaction time is shorter when the stimulus is presented to the eye and the effective response is made by hand, with an instrument of such accuracy as the chronoscope, than when the stimulus is

auditory, the response oral, and when the stop-watch is used, which instrument involves the experimenter's reaction time as well as the observer's. The gross average of all the observers in this experiment, excluding that one who was suspected of reacting too quickly, and also excluding the abnormal subject, is 1.013. It seems fair, then, to count any increase exceeding .3 seconds as possibly significant, provided that there are other supporting evidences, that is, some of the other 'complex signs' listed below. On the other hand, the striking of a complex is not invariably signalized by lengthened reaction time. Pleasurable emotion may quicken instead of delay. Likewise, unless there is an effort, conscious or unconscious, at repression, the time may not be very much lengthened. The prolonged reaction time, then, cannot be taken as the invariable sign of a complex. It is only one among others, and may be lacking. A very short reaction time may be as truly a sign of complex as a very long one. One observer responded to *dream* by instantly pressing the key,—time .206!—, with no consciousness of her mistake, but the significant introspection, "I thought, 'Other people dream, but I don't.'" Such shortened times as this are not included in the tabulation, but they cannot be overlooked as complex indicators. Even when an association is given, and no error can be detected in any part of the response, the time may be very short. An observer who had an obvious "In love" complex responded to *bride* with a time of .363, and with the trivial associate *groom*. This, however, was in the repetition series. When *bride* occurred in the first series the response was signalized by length of time and by a significant association. It is not unusual for the response to go to the opposite extreme when reproduction is tried, the first response having been significant. Jung (10) has observed that the subject is seldom able to reproduce a "complex" association.

2. Perseveration. Sometimes there is no apparent connection between the stimulus word and the reaction word, yet the latter is used, not once only, but several times; also, it is used neither consecutively nor at regular intervals. This is perseveration, and if it is well marked, if the word is usually irrelevant, if the stimulus words are of a significant sort, and if the reaction time is significant in any way, it may generally be taken as a sign of complex. An example is the response *hope*, given to the following stimulus words, friendship, master, pity, wealth, sin, victory. In each instance there was another complex sign present, sometimes more than one. If the perseverated word itself

occurs among the stimuli it is pretty sure to bring a significant response. The exact interpretation of this would depend somewhat on *where* the word occurred, whether before or after the perseveration began.

3. Vacuum, or blankness of mind. This, of course, cannot always be taken as a complex sign. It may occur if the word is difficult to understand, if it seems remote to the observer, or if it follows a word of a very different import (although, as a rule, unless some unusual reaction has just taken place, words are not affected by preceding words, and as a consequence of the method here employed there is plenty of time for the effect to die out before the new one comes). Inattention, and distractions from the outside may also induce blankness, as may fatigue. If none of these factors are present, and if there is some other complex sign as well, vacuum may be taken as an indication of complex. Example: *part*, time 2.870, introspection—"Could think of nothing for a long time. Finally a vague image of people taking sides, seemed to be women, maybe suffragettes." This, when analyzed, was found to be related to one of the dominant complexes of the subject.

4. Irrelevant, or unmeaning response. This may take two forms, (a) the qualitative relations between a stimulus and a response are of unmeaning character, (b) the response itself is without meaning—i. e., clang associations. The second form is less common than the first. The introspection sometimes reveals a relevance that would not otherwise be apparent, even to the observer himself. An example of the first form is *book—tree* (perseverative). An example of the second is *dear—mear*.

5. The phenomenon of misreading must be taken as significant if there is supporting evidence of complex, or if no cause is to be found in the printing of the word, the lighting, etc. Thus one observer, after having used *tree* as a perseverative response five or six times, misread *tree* as *thee*, and associated *me*, when *tree* occurred as a stimulus word; as the word was clearly printed and as no other observer had any difficulty with it, save one, who also presented evidence that *tree* touched a complex, this case of misreading is interpreted as a complex sign. Analogous to misreading is inability to read. One subject had great difficulty in reading *marriage* (a word reacted to significantly in every case) and said that the letters seemed to be one above the other and jumbled together. The word was, of course, clearly printed.

6. The failure to get an associate will usually occur with No. 3, "vacuum," but not always. Sometimes there is a

rush of ideas but nothing articulate. Of course this failure may be due to some of the causes mentioned in the discussion of individual differences and reaction-habits, or it may be due to the strangeness of the word. There are no really uncommon words in the list, however. We might venture to say that every one of them would be met with in the reading of a single issue of a daily newspaper. When no "harmless" explanation will satisfy the case, then the failure may be taken as an indication of complex. The observer's own account of the reason for the failure is by no means trustworthy, even though offered with full sincerity. An unmistakable case was the word *abuse*, when no word came, and no idea of any sort was fully conscious until the observer finally pressed the key, fearing lest the weight on the clock should reach the bottom, while she remained passive, and so jar the mechanism. It was therefore not a true reaction, and the time is not so long as it would have been had she waited for an association. After the reaction came a picture of a horrible looking man, who was thought to be *abusing* someone. The time elapsing before the clock was stopped was 8.487. This observer had an experience in childhood with which this image was remotely connected. She had now an exaggerated dislike, amounting almost to hatred, of men, as *masculine*, as part of a strong sex-complex.

7. Failure to give the motor reaction. In some few cases the association is so absorbing, because of its strong interest or its affective tone, that the motor reaction is inhibited or, what amounts to the same thing, forgotten. Such instances are very rare, and this infrequency of occurrence gives them the more importance. The *habit* of response by the motor reaction is usually so firmly fixed that it tends to take place after a certain interval, even though no associate has been obtained and though the mind remains a blank, and all other activity is inhibited. This tendency, by the way, has much to do with the fact that there are relatively few very long reaction times. When this habitual action is inhibited we may be pretty sure that there is a strong reason. One such case is in response to the word *knight*. The preceding word was *lady*, and this had recalled a romantic picture, from a fairy tale, that related to a very common complex, exposed by other words as well. When *knight* came the observer exclaimed enthusiastically, "Ah! the Prince! the Prince! the Prince!" and quite forgot to press the key. She explained that "she was so delighted that the prince came in just after

the lady." Such excess of feeling, however, must have meant a reinforcement of the association, due to a complex.

8. What might be a variation of the failure to associate is the *surrogate response*. The observer cannot find an association word, is conscious that the word likely to come is one he would wish to suppress, perhaps, so glances around, and names some object in the room, or, possibly, something connected with the dress or the person of the experimenter. Since the giving of objects near at hand is very unusual, the associative thought nearly always running in paths remote from the present time and place, such instances are likely to have a significance.

9. Embarrassment, evidenced by a nervous laugh, or by much hesitation and stammering, is a universally recognized sign. A good many instances of this occur in these experiments, sometimes with words that are obviously significant, such as *marriage*, sometimes with words that seem trivial and which are responded to in an unusual manner by only one observer. An instance of the latter sort was *key*, with no reaction word, but a visual image of a big brass key, associated with a brown door, then complete blankness of mind. The reaction was accompanied by a laugh and a slightly flustered manner.

10. Conscious emotion is not always a sign of complex, and on the other hand, a complex may be exposed without any accompaniment of conscious emotion. Cases of emotional reaction are numerous, as some of the tables given in the earlier divisions of the thesis show. They are more likely to be complex indicators when the observer is unable to account for the emotion. A mere sense of pleasure, or of aversion, detached and impersonal, is not necessarily, or often, a complex sign, or so the correlation of these results indicates. One example where emotion was strong, where a complex was undoubtedly present, and where the subject fully understood her emotion is found in the association *child—mother*, with a reaction time of 1.752. The introspection contains this statement, "I had a feeling that I can't quite express when I saw the word *child*. A feeling that I always have when I see a little child—half pleasant, and yet it hurts, so not pleasant in a way. A feeling as if one would like to cry." This complex had been analyzed before, and the repression was largely freed. This might account for the fact that the time was not very long.

11. The association word may be the chief indicator of the complex. It may be related to the stimulus word in a way

that reveals a significant background or it may indicate an inhibition or a state that is *almost* a vacuum. Few words of very significant meaning occur, and one may surmise that this is due to successful inhibition. A trivial associate, accompanied by a delayed reaction and signs of confusion and embarrassment may indicate that a more significant word was intended, but that it was repressed. Sometimes the introspection reveals that the reaction word given was not the one intended. Such was *fall-down*, when *down* was acknowledged as not the word meant—the real word, however, did not emerge fully into consciousness—and as trivial, and inadequate to the meaning, which was moral, and was admitted to open a complex. Clang associations, such as *fall-call* may be significant in like manner. An incomplete response may indicate a complex, as for instance *seed-peh*, when *pod* was the word intended, and represented by its initial sound, yet *pod* was not related to the thought tendencies present, which took seed as symbolic. This inappropriateness may have caused the stopping of the pronunciation of the word. A reaction word that merely adds a suffix to the stimulus word may be a substitute for a significant word, as, for example, *ridiculement*. This, in addition, is a nonsense word. Another striking one is *bride-bridle*. An anagram, or near-anagram may even be used, as *bride—bird*, the subject saying that the letters of the stimulus word rearranged themselves into *bird* and she was unable to think of anything else. The tendency to add such suffixes as *ly* and *ing* increases with fatigue, and unless we accept Lipmann's theory, cited on page 130, we cannot regard these as significant when fatigue is present.

12. Last of complex signs to be mentioned as occurring in the course of this experiment is the post-critical response. This is the case when a word insignificant in itself has an inhibited or delayed reaction because of the effect persisting from the word just preceding it. Even when the words were given fully two minutes apart, as they usually were in this experiment, allowing time for the introspection and for taking notes, this phenomenon is occasionally observable. In the majority of observers, for example, the word *new* called forth a delayed response, or perhaps a failure, yet the introspection revealed nothing significant. When it was noted that the word *new* followed *sin*, which nearly always called forth an unusual reaction, and when it was taken into consideration that the train of thought in the after-period might be even more emotional than at the first apprehension of *sin*, an explanation of the unusual reaction to *new* was found.

While it is to be expected that complexes will be found to be individual affairs, depending for their character upon the history and personality of the individual, yet it is well known that some complexes of feeling are universal.

The word *complex* is not here used in its most limited sense, as it is by Freud and Jung, to denote a group of emotionally toned ideas completely repressed into the unconscious, and having a sinister effect upon the mental life of the individual, but rather in the broader meaning given it by Hart in his "Psychology of Insanity" (9). Hart says "A complex is a system of connected ideas with a strong emotional tone, and a tendency to produce actions of a certain definite character" (p. 51). It has been questioned whether this view of complex does not make it really nothing more than what is known as "interest." It is taken by the writer to be something more than, and different from, mere interest, in that it bears a stronger emotional tone, in that it more definitely determines action, and, chiefly, in that it is a system of ideas and an emotion which the individual would conceal from others, although it is not necessarily concealed from himself. It is very likely to be below the level of conscious thought, but the subject may, on the other hand, be fully aware of it, or aware of it in varying degrees. Such groups of ideas tend naturally to gather round the great facts of life, such as birth, marriage, and death. *Complexes*, in the sense just given appear in connection with words relating to these great facts in every observer tested by this experiment. These complexes I have styled "Common Complexes." If the number of persons tested had been large enough to be representative they might have been termed "Universal Complexes." A list of common complexes is given below, with the complex signs shown by each observer with four of the clearest cases. Of course no single word calls out equally strong indications in every observer. On the other hand there are complexes that seem common to all but are not aroused by the same words in all.

Examples of common complexes:

1. Marriage.

Observer a. Inability to read, delayed reaction, inappropriate image.

Observer b. Perseverative idea of *two* people, solemn emotion, very short time.

Observer c. Difficulty in reading, clang association, false reproduction.

Observer d. Hesitation, time under-estimated, word *tie* automatically.

- Observer e. Confusion, a rush of emotional tendencies. Association word *birth*, slightly inhibited. Time long.
- Observer f. Embarrassed laugh, hesitation in speaking, no association voiced. "Don't know what I thought of." Clang association when series was repeated.
- Observer g. Embarrassed laugh, no association, mechanical motor reaction, time short.
- Observer h. Time long. Felt anxious to get a word quickly, "to get it over." *Divorce* came with a distinct sense of relief, as if this were a way out of the trap. (This from the man hater.)
2. Dream.
- Observer a. No word, impossibly short time. Thought "Other people dream but I don't." Unconscious of error in reaction.
- Observer b. A long blank. Time 4.958. Finally a connection with fiancée, with unusual features in the association. Thought of pressing the key and saying he could think of nothing. The inhibition of association was nearly successful.
- Observer c. Prolonged reaction, no definite association, a confusion of thoughts, finally settling to recollection of one significant dream.
- Observer d. Slightly prolonged. Word *ghost*. A visual image, which is very rare with this observer. The reaction seemed utterly irrelevant, according to the observer.
- Observer e. No reaction word, sense of familiarity. A beginning of a word but it was inhibited.
- Observer f. No association, no motor reaction, but a vague idea of dreams in general.
- Observer g. Hesitation, blankness, Calpurnia's dream thought of, but no word or image.
- Observer h. Premature reaction, without any association. The feeling that this was something familiar and intimate and that therefore the key must be pressed at once.
3. Sin.
- Observer a. No associate, a vague reference to "Vision of Sin" and a tendency to say *Longfellow*, though he knew it was *Tennyson*.
- Observer b. Spelt word, s-i-n. Distinctly unpleasant feeling, and a groping to get hold of an abstraction. In after period it was thought of as "something you ought not to do." Post-critical reaction.
- Observer c. Blank, then rhyme, post-critical rhyme again, and an irrelevant visual image.
- Observer d. Redundant response, two words given, both perseverative, both irrelevant. Prolonged time.
- Observer e. *Death* as associate, automatic, with no consciousness of connection. After reaction came quotation "Wages of Sin is Death." Post-critical reaction to succeeding word.
- Observer f. Clang association, post-critical reaction, one surprising to the observer.
- Observer g. The Welt-Schmerz complex indicator, which will be treated under "Individual complexes."

- Observer h. Complete inhibition, no reaction. The observer could not understand the inhibition, as it was a familiar idea, "I've been to Sunday School. . . . Everything you do, almost, is a sin."
4. Death.
- Observer a. Prolonged reaction time, blankness, a gradual dawn of a visual image connected with brother's death. Non-conscious emotion.
- Observer b. Word *youth*. vis. im. of a young girl dead. A feeling that death was hovering all around, and that *youth* made it sad. Long reaction time.
- Observer c. Laughter, reaction word *cold*. Feeling of aversion. Faint visual image of tall figure with scythe.
- Observer d. Clang association, *dearth*. No feeling. Prolonged reaction time.
- Observer e. Reaction word *head*, and sense of its inappropriateness, "All set for a quick reaction, but it was inhibited."
- Observer f. Automatic reaction, time .222! A long blank, then vis. im. of a grave yard, and strong emotion. "A shaky feeling,"—"it cast a damper over my whole state of feeling. I don't like to think about it." In repeated series a false reproduction, a solemn, awed feeling, quite strong.
- Observer h. Word not understood, so no reaction. This was one of a dozen words given orally. There had been no difficulty in understanding any words, except one other that was also suspected of opening a complex. This observer began to suffer from an hysterical neurosis soon after her father's death. She had nursed her father for eight months.

Other words that are accompanied by one or more complex signs in all or most observers are: coffin, choice, bride, ridicule, friendship, child, quarrel, contempt, expense, size, friend, mate, separation, abuse, delight, prison, pity.

Some words that are in every case met by prolonged reaction time, thought to be due to other causes than *complex* are: green, blockade, custom, water, coat, new, kitchen, suspense, dwarf, pamphlet, contentment, masquerade.

It is not possible to say that none of the second list refers to complexes. It is only said that the evidence is insufficient. Likewise, it is not positive that all in the first list are complex indicators, but the evidence points that way. At the end of this paper will be found a graded list of words, giving the number of observers that reacted significantly to each.

Words are not the most reliable tests, when treated in the manner suggested above, though this is the way most investigators who are not, like Jung, seeking to make diagnoses, treat them. The same word may open different complexes in different persons. On the other hand there are complexes

that are common to all, or to nearly all, though they are not reached by exactly the same word in each case. Besides the fundamental complexes already noted, there is the *wealth* complex, common to four of the eight, shown by some or all the words relating to money. The *travel* complex shows some traces in all, strongly in some, when almost every word relating to travel or movement is responded to by the perseverative word *go*, or by a pleasurable emotion. The *ambition* complex, signalized by such words as victory, goal, captain, etc., shows traces in most observers. Words pertaining to out-of-doors, and particularly such words as garden, seed, plant, bring out some strong traces in every observer though it is not the same words that are active in every case. It is quite possible that totally different complexes are touched by these same words. The motherhood complex is evident in three out of five women, and the fatherhood complex in two out of three men. The "*love*" complex, which is not quite the same as the marriage complex—or is not necessarily the same, as the love complex usually arises in connection with a definite 'affair,' whereas the marriage complex exists, either repressed or conscious, in all, without any external object or encouragement,—is clearly evidenced in all the men, but only equivocally or not at all, in the women. This is altogether in accordance with the laws of society, and, we suppose, with the laws of biological evolution. As an example of how results are grouped to obtain clear evidence of a complex one of the love complexes will be given here, because it illustrates the method very clearly, and also because it is quite "harmless," even to a Freudian.

The first word that brought a significant reaction relating to this complex was the word *dream*, already cited in another connection. A very long reaction time, 4.958, an inhibition that threatened to retain the mastery, and difficulty in relating the experience were complex signs. The introspection showed that the word recalled a telephone conversation with a young lady, and afterwards, through later associations the experimenter learned that this conversation was connected with his fiancée. Then came *snake*, with a long reaction time. The image of a *young lady* who is afraid of snakes was all that occurred. In the after period came full recollection of a scene with this young lady, wherein a snake was concerned. Then came *marriage*, which has already been given. There was inability to read the word at first, *as the letters seemed one above the other*, and jumbled together. While we have distinguished between a love and a marriage complex it seems

fair to include this word here, as the love complex was so very much in evidence that it would surely have absorbed the other. Then *dear*, association word *deer*, with a laugh, and "knew it wasn't appropriate." "*Knew at once that dear could bring no associate.*" Time very short (.678). A little later the word *friend* brought the following reaction. First, blank (conscious of inhibition), then visual image of a young lady. Consciously trying to find a *person* as an associate. Knew all the time that the intention was toward a person but had to wait for the image to come, time, 1.777. Some fifteen minutes later, on the same day, the climax came with *kiss*. There was a premature reaction—(protective?) but no association given at first. Then the observer began to tell slowly, with evident difficulty, what the word brought to mind, interrupting himself to say, "You ought not to put up such a word." It brought up an experience with the "Young lady." He admitted that this association came at once, that he tried his best to think of something else, but could not, so gave up and confessed. After a few indifferent words came *bride* and this at once aroused the image of the young lady, and all the emotions of the former experience. He "tried to keep it off, saw it was coming, couldn't stop it." The time was longer than the time for *Kiss*. When these words occurred in the repetition series there was no reaction, no distinct recollection of how he had reacted before, but a recollection that "he had had trouble with the words." A few minutes later came *lady* and this aroused the same association, but much more quickly, with no struggle, no resistance, little emotion, and the image was fainter also. The wave was receding. When the word *choice* came, after seven indifferent words, there was complete inhibition for a time, consciousness of this inhibition, and then it resolved itself into making a choice of music—looking over sheet music. The time was one of the longest given by this observer, 2.956. Other words that may have related to this complex but have not very clear complex signs are woman, mate, month, misread as *moth*, butterfly, blush.

The method employed here is obvious, as the complex was obvious. All that was necessary in order to establish this complex was to note what words brought the same associate, although there was seldom an associated *word*, as this observer was of the visual type, and to examine the reactions and introspections for complex signs, which are sufficiently marked. Few other complexes found are quite so obvious, but the general method is the same for all observers who react with clear images or full-fledged thoughts. Such give few verbal

indications. For the type that reacts with words, automatically, with very few images and little thought content, a different method must be employed. Perservation furnishes a principal road of approach here. The perseverated word may be an arbitrarily chosen word used on every occasion when it is desirable to cover a complex—and this concealment may be unconscious—or it may be a word that expresses the emotion which the complex arouses, and so not truly irrelevant, though it bears no external relation to the stimulus word. An instance of the former sort may be *tree*, used to respond to ten words, about half of them showing some possible connection, the other half irrelevant. When *tree* itself occurred as a stimulus word it was misread as *thee*. Of course it is possible that *tree* itself is really a complex word, but the evidence is doubtful. An instance of the latter sort is the perseveration of *hope* in the same observer. A thread of meaning connects the words to which *hope* was responded, although *hope* itself is not an appropriate response to any of them. This observer always gave logical responses except in cases of perseveration, that is, an illogical response was sure to be repeated. In determining complexes in this case perseverated words were the starting point, but no evidence was accepted unless there was more than one complex sign to each reaction considered. Some of the complexes unearthed in this way were the “travel” complex (probably a secondary complex, but this point cannot be established by the data at hand), the “discontent” complex, if we may call it so, for want of a better word—a complex revealed by the perseveration of *hope* and *full*, suggesting that hopes of better things and of wish-fulfillment were entertained, and the sex complex, indicated by several different groups of words. These will be discussed more fully under the head of the Freudian bearing of the experiment. The interpretation given will doubtless look far-fetched unless details are furnished.

The most interesting complexes, if not the most valuable for scientific purposes, are those that are distinctly individual and that give an insight into the character of the individual. While it is worth while to establish by experimental evidence that there are fundamental and universal ideas and emotions, it is no less important, for practical purposes, to discover the individual constellations. Some individual complexes are here cited as of interest and as presenting the definite results of the experiment.

Observer A: Love complex, exposed by 16 words, 33 complex signs, such as prolonged time, premature reaction or short time, embarrass-

ment, laughter, confusion of thought, unsuccessful effort to inhibit, significant response, blankness of mind, surrogate response, irrelevant response, misreading, inability to read. Also "The Lie" complex, exposed by 2 words, with 6 complex signs, such as prolonged time, blankness of mind, inhibition, unusual association, going back to childhood.

Observer B: "Dancing" complex exposed by 6, and possibly 15 words, and 15 complex signs, prolonged time, emotional excitement, significant associate. Also "Reciprocity," or "Twoness," exposed by 9 words and 16 signs, as prolonged time, perseverative idea of two people, emotion, significant association, post-critical response, frank consciousness of the complex.

Observer C: "Garden" complex, exposed by 8 words and 23 signs, as clang associations, redundant response, prolonged time, mixed emotion. (This is a puzzling one. It might be symbolic.) "Friendship" complex, exposed by 4 words and 12 signs, as prolonged time, clang association, irrelevant response, blankness of mind, evidence of repressed emotion.

Observer D: "Travel" complex exposed by 4 words and 12 signs, as perseveration, heterogeneity, redundant response, premature reaction, blankness of mind, automatic response, frank consciousness of complex. Also a "Hope" complex, exposed by 6 words, and 22 signs, as perseveration, prolonged time, misreading, automatic reaction, heterogeneity, irrelevance, some emotion conscious, more unconscious.

Observer E: "Marriage" complex, combined with "Love," exposed by 15 words and 32 signs, such as prolonged time, blankness of mind, confusion, significant association, failure to associate, feeling of being "in a trap," repressions, emotion, acknowledgment of complex. Also a complex connecting with the word "lake," real meaning unknown to experimenter. This was exposed by 5 words and 11 signs, much the same as the "Marriage" and "Love" complex signs.

Observer F: "Death" complex, with 5 words and 12 signs, among which were premature reaction, intense, painful, emotion, blankness, false reproduction, failure to react, failure to associate. A "Love" complex, exposed by 6 words and 13 signs, such as prolonged time, confusion, embarrassment, laughter, clang association, quotation, significant association, failure to react.

Observer G: "Dress" complex, with 6 words and 13 signs, among which were prolonged time, unusual and significant association, surprise, pleasurable emotion, blankness. Also a marked "*Welt Schmerz*" complex touched by 16 words and shown by 54 signs, chief of which was a recurring visual image of a mass of people, accompanied by prolonged time, failure to associate, great emotion, significant association.

Observer H: The "Motherhood" complex, exposed by 6 words and 12 signs, as prolonged time, inhibitions, conflict of associations, strong emotion, redundant and significant response. And also a "Manhating" complex exposed by 6 words and 22 signs, among which were prolonged time, significant response, irrelevant response, blankness, emotion, sense of hurry, failure to associate. (This observer is abnormal.)

V. The next, and last, question to be taken up is that of the bearing of this experiment on the Freudian doctrine. Is there any evidence presented by these results in support of the "complex theory" of Freud? This theory is, in substance, as follows:

1. The unconscious must be accepted as the general basis of psychic life. Experiences are not forgotten, or lost, they are repressed into the unconscious, where they remain active and dynamic. Everything conscious has its preliminary step in the unconscious. Our views, thoughts, and ideals, are all tinged, nay, formed, by these unconscious activities. These find their way out into the conscious life in indirect and hidden ways. Many otherwise unaccountable actions, associations, fancies, errors of apprehension, etc., are explainable as expressions of the repressed wishes, or "complexes" (4).

2. All effectual unconscious complexes are sexual, in Freud's broad sense of the word sexual. However broadened the complex may be to include affections, ambitions, fears, of every sort, there is a sexual component present. The sex instinct is therefore the fundamental instinct. All desires, wishes, and hopes are *derived from sexual desire* (6).

3. The unconscious thoughts, the complexes, all ambitions, wishes, and fears, etc., have their rise in infantile sexual experiences and thoughts. The memory of these is repressed into the unconscious, but the *complex*, i. e., the group of emotionally toned ideas, expressing an unfulfilled wish, remains active, conditioning the conscious processes. Thus is the child father to the man (6).

It is unnecessary here to go into Freud's applications of these principles, since all that we are concerned with is the question whether or not the association method used by Freud himself in exposing complexes, will, when applied by an impartial experimenter to normal subjects, yield evidence in support of these principles. What is their bearing upon the association experiment? Obviously, from data gathered in this experiment, *something* that is unconscious does play a rôle in determining the association of ideas, unless the association is a chance juxtaposition, and psychology has rejected the latter view. There is evidence also that this unconscious is active and dynamic. The complicated train of ideas sometimes recalled to consciousness afterward shows how intricate was the association that came out as an automatic response, often to the surprise of the subject. Associations are sometimes tinged by an emotional tone which the subject is at loss to account for. Also there are physiological manifestations of emotion, apparent to the experimenter without the aid of special testing instruments, manifestations such as quickened breathing, flushing, dilated pupil, fluttering of the hands,—of which the subject is unconscious. This is analogous to the emotion sometimes called forth by automatic

writing. These facts, brought out by experiment, lend support to the theory of the dynamic nature of the unconscious, and of its reality as a potent factor in conscious activity. The given associate reveals a *complex*—a group of emotionally toned ideas—at times, of the existence of which the patient is unaware, and he is convinced of its presence only by cumulative evidence. In this experiment there was little opportunity, and it formed no part of the purpose, to acquaint the observer with his own complexes but there was evidence that the observer was unaware of some of his complexes. This evidence was found in the introspection and especially in that part of the testimony elicited by the questions of the experimenter. The observer was sometimes aware of the emotion aroused without being able to explain it. When his associations were brought together and compared the complex stood out plainly, yet the observer sincerely denied its existence. Complexes, in the broad sense in which we have taken the term, are not necessarily painful and not necessarily repressed. An example of a complex that was both painful and repressed was the *death* complex of the neurotic subject. In a more normal subject an example is found in the horror connected with *prison* and in the *friendship* complex of another, who always associated the word *penmanship* (it was tried three times) and who could get no thought of the meaning of the word *friendship*, nor any definite thought except a reference to a friend who was absent. There was no conscious affective tone to this experience, but there was delayed reaction and an unusual absence of thought content. The complex that is fully conscious, and pleasant, is instanced by the *dancing* or *motion complex* of one observer. This sort too may present indirect evidence for Freud's first thesis, but it is to the other sort that we must look for direct support. The complex that is so far repressed that the subject is seldom or never aware of its existence is best explained by the theory that Freud advances.

The second thesis, that all the unconscious complexes have a sexual connotation, receives only a partial and inconclusive support. We can say that there are sexual complexes exposed in every observer—the marriage complex is sexual. We can say that some complexes the main objective of which does not seem to be sexual have also a sexual factor. But this does not amount to saying that *all* complexes are sexual, and all important motives to behavior are therefore sexual, even in the broad sense. This experiment could not be sufficiently wide in scope to establish this point, but if such data as could

be obtained were in its favor the fact would be worth noting. A complex traced through the perseveration of *tree* as a response, when tree seemed to express a state of mixed but predominantly pleasurable feeling, in which love of natural beauty was involved, was found to have a sexual component when the seemingly trivial association *fruit-tree* came up. The observer here acknowledged the presence of the sexual complex, otherwise the experimenter would not have been able to detect it. She could have known only that there was a complex of some sort. An observer less frank or less practised in introspection would not have given the information.

The *hope* complex of one observer seemed to be a complex of discontent with the present state of things in general, and the perseverated response voiced the unspoken wish. If one were a thorough-going Freudian one would say that the words to which hope was responded are evidence of a sexual, or Freudian, complex. They are friendship, master, pity, wealth, sin, victory. *Sin* brought a second associate also, in *pain*. But as we cannot proceed on the Freudian assumption we cannot regard these words as giving evidence. The words to which *me* was given as an associate are more suggestive. They are tree (misread as *thee*), dear, kiss, abuse, mate. Indeed, all the complexes shown by this particular observer *could* have a sexual connotation (including the marked travel complex), but there are only vague and inconclusive indications in the associations themselves. It would be necessary to assume the Freudian symbolisms and principles of interpretation in order to see in them incontrovertible proofs of sexual complex. The leaning of the experimenter toward sexual interpretations in this case comes from observations of behavior and of trends of thought, things noted in relationships remote from the experiment, from dreams told by the observer, and other such considerations that have no right to enter into the interpretation of the experimental data. And even if this observer were found to have only sexual complexes (again in a broad sense) it would not prove the theory. There is no doubt that *some* of the subjects examined by the Freudian school fully justify the theory but it cannot be made to apply universally from these few cases. In this experiment, as stated before, all observers give evidence of the presence of at least one sexual complex, in some form, but there is no evidence that the sexual complex is the dominant one, or that every complex has, hidden away in it somewhere, a sexual factor. In the table of complexes given, which did not represent *all* the complexes found, a number of sexual complexes

are named. All are susceptible of sexual interpretation if once we admit Freud's principle. But that is just what we cannot do until we have unmistakable evidence, and we fear that we are not likely to get it by this method.

To the third thesis of Freud's theory the experiment gives no answer. Observers were asked to call attention to any association that they recognized as persisting from childhood. This was seldom done. An infantile root of the association was occasionally uncovered by the questioning of the experimenter but such cases are not in sufficient numbers to be significant. As was shown in the comparison of the normal and the abnormal types, references to childhood experiences are more frequent in the latter than in the former, and the infantile memories seem to play a not unimportant rôle in the complexes of the latter. But the point especially to be decided is that infantile experience plays an extremely important part in the complexes, or constellations, of normal, healthy, men and women. It is a point that an experiment conducted in the manner that this one was can never, so it appears to the writer, determine. Freud's method of uncontrolled "Free association" may lead the subject back to early experiences, helped out by skillful questioning and suggestion. But the word-association used here cannot possibly reach to the deep substratum of the unconscious where these infantile elements lie buried when life is normal and healthy. It is only in cases of mental mal-development that they persist near enough to the surface to be reached easily.

The association experiment, by the word-association method, can hardly be a valid test for the Freudian theories in their entirety. There are many points on which it is silent. The symbolic interpretations of Freud, veiling sexual meanings, may or may not be legitimate. But as these symbolic meanings do not penetrate to the consciousness of the subject without outside suggestion in any case, we cannot expect to find any conclusive evidence for them. Words that might be symbolic—there are many such in the list—are sometimes responded to in a way that suggests the presence of a complex, but without an illegitimate amount of guidance from the experimenter they cannot be made to take on a symbolic significance. The association experiment can probe the unconscious to a certain extent, but it cannot probe to every possible depth. We are not justified in saying that there is nothing more than what has been revealed by experiments similar to this one, neither are we justified in assuming as the truth anything that has not been proved experimentally. The experiment here

treated leaves much of the Freudian question open, or it leaves it, to speak more modestly, just where it found it.

VI. This experiment has, when results are brought together, confirmed some facts, brought out by other investigators and has brought up some new data on certain minor points. It has corroborated the statement already accepted by most psychologists, that by the association method mental character may be studied. Many different factors of the reaction, both quantitative and qualitative, enter into the character-indications. It is found possible to establish definite reaction types, with correlation of certain features of the reaction.

In the study of reaction consciousness certain definite features in the reaction come to stand out as 'complex signs.' They are quantitative, qualitative, and physiological. The presence of two or more such signs in any reaction is likely to indicate a complex. As it is seldom that a complex is acknowledged by the observer these signs assume great importance in the exposure of the complex. Certain complexes are in this manner indicated as of common and, it might be inferred, of universal occurrence. These may have innumerable individual variations but there is a fundamental instinct at the base of them. Certain subjects of perennial interest arouse interest and feeling when introduced into the association experiment. They are not *shocking* subjects—the introduction of such would be a gross abuse of the experiment as a means of exposing complexes—but are words in common use and words not evoking extraordinary behavior in every day life. The detached presentment of each word in the association experiment enhances the value of the word, so that it represents a situation to the subject, and he responds accordingly. A part of his behavior to the situation is unconscious, and it is this unconscious part that is most significant. Unconscious mental processes and partly conscious mental processes are much in evidence and the method furnishes a reliable means of "tapping the subconscious." But evidence for the Freudian theory of the unconscious, beyond the first general thesis, is lacking.

If this thesis has anything new to offer it is a new point of view rather than new facts. Hitherto the work upon the complex has been prosecuted from the diagnostic point of view, with the purpose of seeking the individual complex, while the common complexes were disregarded, being taken for granted. In this experiment the principal interest has been in finding out just how these common complexes are manifested in different observers, and how far the association method is of

service in uncovering them. A result of the experiment that at least deserves mention, then, is the actual demonstration of the occurrence of certain common complexes in all observers used in the experiment—complexes that manifested themselves in various ways but had certain unmistakeable common characteristics, nevertheless, that could not be concealed by the differences in type.

Of many minor products of the experiment it is impossible to speak, nor has there been opportunity to work out fully all the points suggested by the data. Such points offer numerous incentives to further study, which is their main contribution. The phenomenon of conflicting tendencies in association offers such an incentive. The trend of thought that holds the foreground is very likely to fail of expression, while the association that emerges, either as a word or image, is the result of a trend that was not realized as present until after its culmination. Conflicting tendencies often lead to an inhibition of reaction when no complex is present. The so-called clang associations and rhyming associations are interesting also, as studies. They seem often to indicate a state of resistance to the whole situation, or a *lazy* way of avoiding the effort to associate ideas. They occur oftenest when the observer is bored or fatigued, although they also are sometimes used to conceal complexes. Not unrelated to this phenomenon is perseveration, which, in the results treated here, usually indicated *not* poverty of ideas, but affective mental states. An egocentric attitude usually underlies the perseverative tendency.

A point that there has not been time to work out is that of the general curve in the reaction time of each observer. It has been noted that the time seems to vary most, going to extremes, just after a critical reaction. A question that one would like to see conclusively settled is that of the exact relation of the reaction time to the complex. By the earliest investigators it was thought that a complex always caused a lengthening of the time, but data has since been brought forward to discountenance this view, and, in the opinion of the writer, finally to disprove its correctness.

More detailed study of the data at hand would doubtless bring up more questions, and would perhaps answer a few of them. In conclusion it may be said that this association experiment has proved very fruitful as a means of studying individual psychology, and that it appears to indicate one of the best methods available for the study of a large group of very significant mental processes.

List of words used in experiment:

head; water; green; dream; plant; coat; cigar; kitchen; cold; rose; girl; death; year; wages; window; friendship; master; seed; garden; key; ship; dance; railroad; cave; fight; knife; snake; salt; coffin; mountain; yellow; pity; pain; tree; sky; wealth; sin; new; tunnel; whip; stairway; steamer; wagon; horse; ladder; automobile; blue; voyage; needle; anger; ink; trunk; prison; sickness; lake; village; red; custom; prayer; money; foolish; pamphlet; contempt; finger; expense; bird; fall; book; injustice; black; question; church; organ; captain; victory; bet; frog; separation; hunger; white; child; care; pencil; grief; plum; blockade; suspense; goal; game; marriage; dear; glass; quarrel; fur; size; carrot; paint; part; note; dress; veil; cherry; ace; fruit; age; flower; punishment; box; savage; family; soap; cow; friend; luck; lie; deportment; path; sister; fear; stork; falsehood; diamond; beauty; ring; indifference; costume; lady; knight; anxiety; door; kiss; purity; choice; hay; bride; contentment; ridicule; sleep; month; delight; nest; milk; meat; doll; dwarf; masquerade; woman; abuse; mouth; mate.

Graded word list, showing which words were effectual as complex indicators. The first eight words were significantly reacted to by eight observers, the next eight by seven and so on down:

- 8: marriage; dream; sin; death; coffin; choice; bride; ridicule.
- 7: friendship; child; blockade; quarrel; seed; contempt; expense; size.
- 6: water; coat; girl; flower; anxiety; abuse.
- 5: delight; prison; pity; suspense; dwarf; kiss; horse; dance; song; game.
- 4: year; wealth; anger; finger; separation; friend; tunnel; whip; bet; victory; mate; pride; punishment; prayer; diamond; ship; door; dear; ladder.
- 3: mountain; ring; sleep; stairway; captain; luck; costume; beauty; master; veil; sky; injustice; bright; dwarf; cave.
- 2: plant; book; ace; box; next; bird; goal; free; cold; fear; wages; knight; family; automobile; purity; money; fall; question; care; lie; trunk; pain; knife; fear; falsehood; ring.
- 1: month; lady; ship; cigar; master; key; village; lake; sickness; railroad; bet; plum; glass; fur; fruit; age.

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